

Paper birch

Betula papyrifera



The **volume of paper birch has decreased** significantly since 1983. This is a result of both natural succession and increased mortality. The numbers of seedlings and saplings have also decreased suggesting that paper birch will play a less prominent role in the future.

In the last 23 years, **growth rates have decreased** and are currently negative (mortality exceeds growth). Paper birch has the **highest ratio of mortality to growth** and the lowest ratio of growth to volume of all species in the state. Whereas paper birch makes up about 3% of all volume of trees in Wisconsin, it accounts for over 8% of total mortality.

Paper birch pulpwood production fell 84% between 2003 and 2006. Because biomass of birch is decreasing so rapidly, it is not likely to be a major source of biofuel.

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"How has the paper birch resource changed?"
Growing stock volume and diameter class distribution by year

The [growing stock volume](#) of paper birch in 2008 (Chart 1) was about 620 million cft or about 3% of total statewide volume. This represents a decrease of 41% since 1983 and 26% since 1996.

Volume in growing stock trees is decreasing in all size classes (Chart 2). The number of trees is also decreasing dramatically (Chart 3). [Pole-sized trees](#) have decreased in number by almost 30% since 1996. [Seedlings](#) and [saplings](#) have decreased as well, suggesting that paper birch will play a less prominent role in the future.

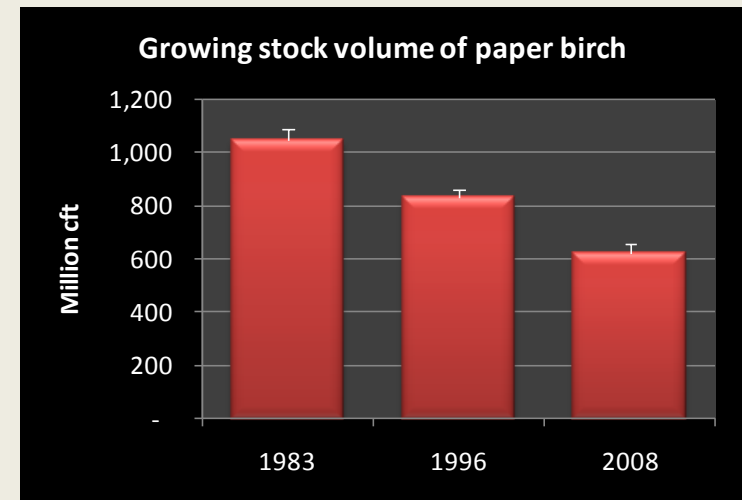


Chart 1. Growing stock volume (million cubic feet) by inventory year.
 Source: USDA Forest Inventory and Analysis data: 1983, 1996, and 2008.

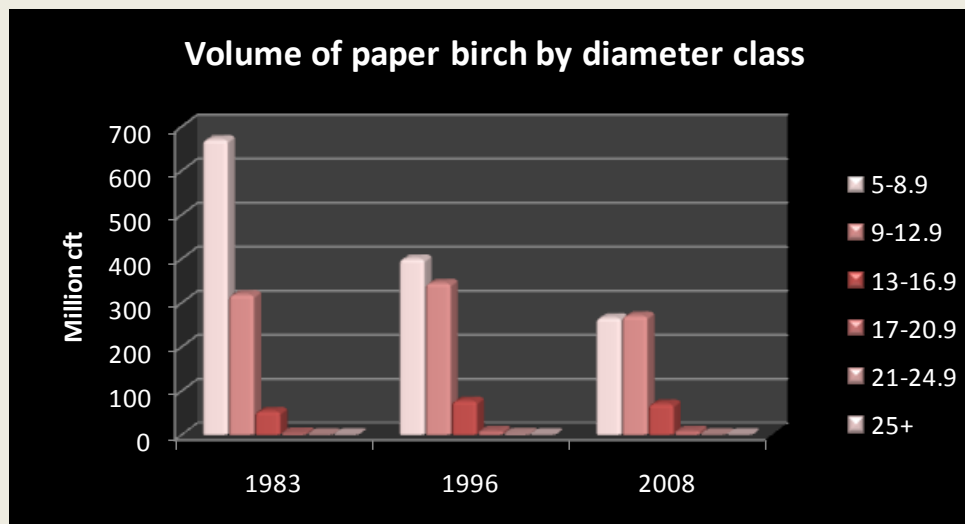


Chart 2. Growing stock volume (trees over 5 inches dbh) in million cubic feet in 1983, 1996, and 2008.
 Source: USDA Forest Inventory and Analysis data: 1983, 1996, and 2008.

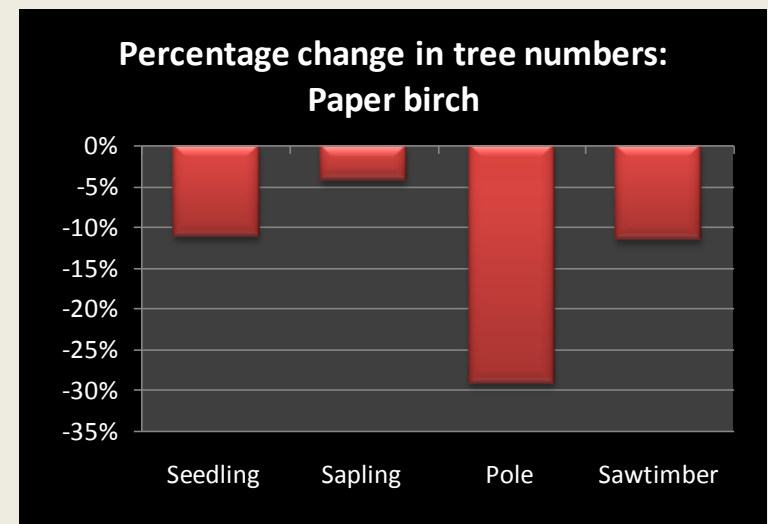
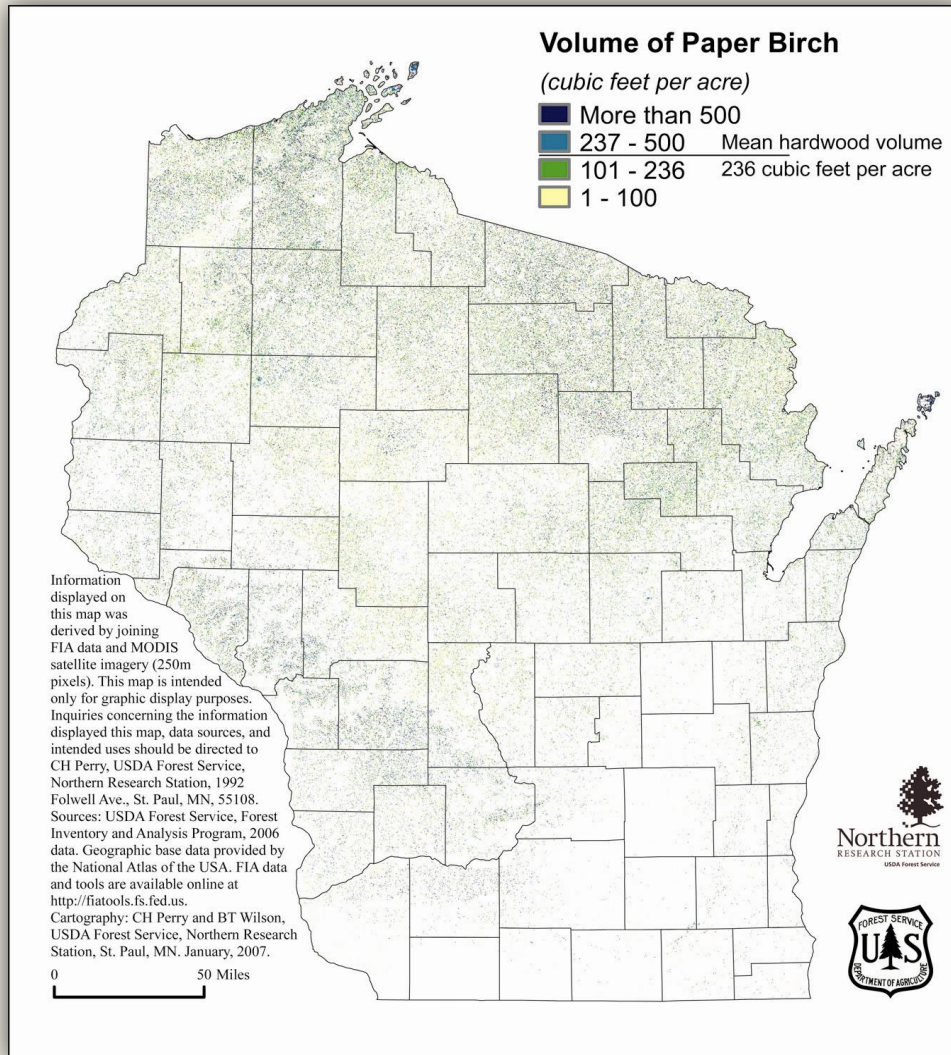


Chart 3. Percentage change in the number of live trees by size class between 1996 and 2008.
 Source: USDA Forest Inventory and Analysis data: 1996 and 2008.

"Where does paper birch grow in Wisconsin?"

Growing stock volume by region with map



The largest volume of paper birch, 69%, is located in northern Wisconsin with lesser amounts in the southwest and central parts of the state.

Most paper birch is part of the aspen / birch [forest type](#) and, to a lesser extent, the maple / basswood type. In southern and central Wisconsin, it's also a part of the oak / hickory forest type.

Table 1. Growing stock volume (million cft) by species and region of the state (2008).

| Species | Central | North east | North west | South east | South west | Total |
|------------------|---------|------------|------------|------------|------------|-------|
| Paper Birch | 68 | 184 | 245 | 37 | 85 | 620 |
| Percent of total | 11% | 30% | 39% | 6% | 14% | 100% |

Source: USDA Forest Service, Forest Inventory and Analysis 2008 data

Additional tables: Volume by county in 2008 ([pdf](#); [Excel](#))



"How fast is paper birch growing?"
Average annual net growth by region and year

The [average annual net growth](#) of paper birch (Chart 4) decreased by 78% between 1983 and 1996. Net growth since 1996 has been negative indicating that mortality exceeded growth during this period.

Table 2. Average annual net growth (million cft/year) of growing stock and the ratio of growth to volume by region of the state

| Region | Net growth | Ratio of growth to volume |
|-----------|------------|---------------------------|
| Central | 0.3 | 0.5% |
| Northeast | 1.6 | 0.9% |
| Northwest | -0.5 | -0.2% |
| Southeast | -0.6 | -1.6% |
| Southwest | -1.5 | -1.7% |
| Statewide | -0.7 | -0.1% |

Source: USDA Forest Inventory and Analysis 2008

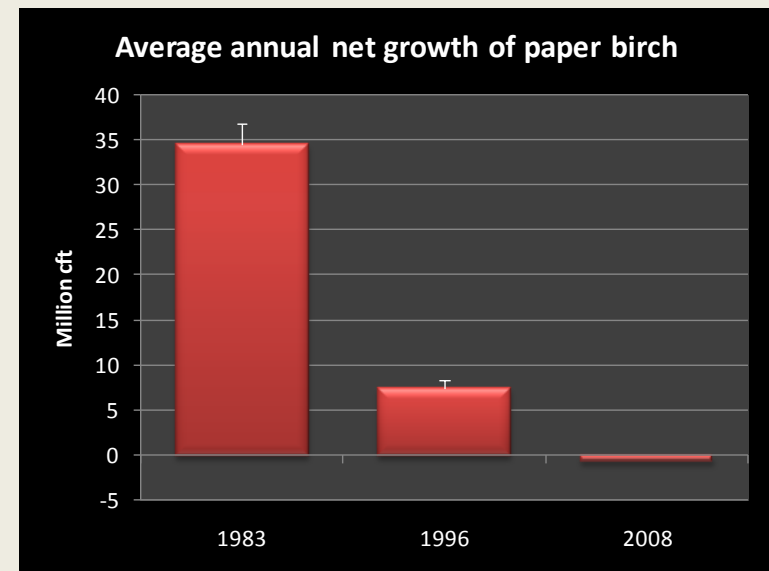


Chart 4. Average annual net growth (million cubic feet).
 Source: USDA Forest Inventory & Analysis data: 1983, 1996, 2008

Growth rates for paper birch are fairly low throughout the state but are negative (mortality exceeds growth) in northwest and southern Wisconsin (Table 2). The statewide ratio of growth to volume for all species is 2.8%, much higher than the negative growth rate of paper birch.

Additional tables:
 Average annual growth, mortality and removals by region ([Pdf](#), [Excel](#)).



"How healthy is paper birch in Wisconsin?"

Average annual mortality: 1983, 1996, and 2008

Average annual mortality of paper birch, about 15.7 million cft per year, more than tripled between 1983 and 1996 (Chart 5) but has fallen 23% since 1996 (this difference may not be statistically significant due to sampling error).

The ratio of mortality to gross growth is 102% for paper birch, much higher than the statewide average of 26% and the highest of all species groups (Table 3). Whereas paper birch accounts for 3% of total growing stock volume in the state, this species makes up over 8% of total mortality.

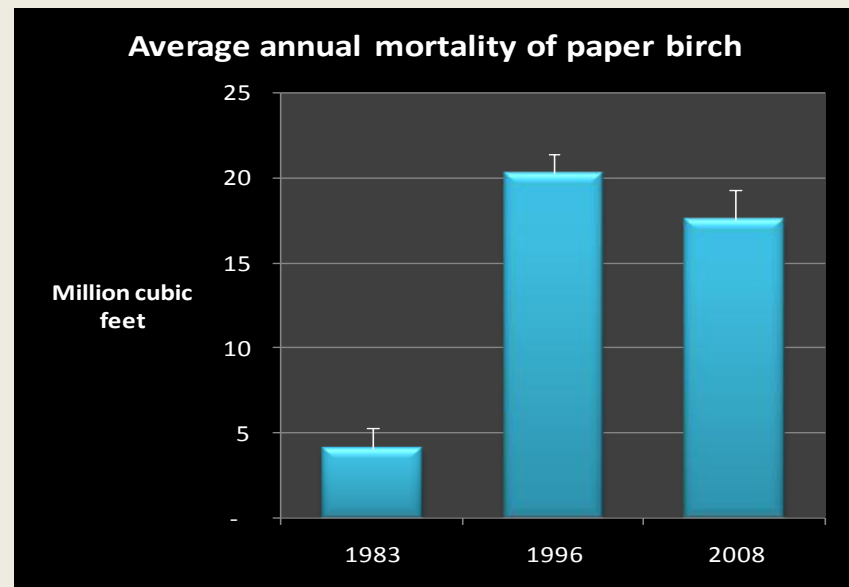


Chart 5. Average annual mortality (million cubic feet) by inventory year.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, 2008

Table 3. Mortality, gross growth , and the ratio of mortality to gross growth.

| Species | Average annual mortality (cft) | Average annual gross growth (cft) | Mortality / growth |
|-------------|--------------------------------|-----------------------------------|--------------------|
| Paper Birch | 15,700,892 | 15,417,130 | 102% |

Source: USDA Forest Inventory & Analysis data: 2008

Additional tables:

Average annual growth, mortality and removals by region ([Pdf](#), [Excel](#)).



"How much paper birch do we harvest?"

Roundwood production by product and year

In 2003, paper birch accounted for 28.6 million cft or 7% of Wisconsin's total [roundwood](#) production (Chart 6). Over ¾ of this was used for pulpwood, 14% for sawlogs and 8% for fuelwood.

Between 2003 and 2006, pulpwood production fell 18.6 million cft or 84%. Paper birch accounted for over 16% of all pulpwood in 2003 but less than 3% in 2006.

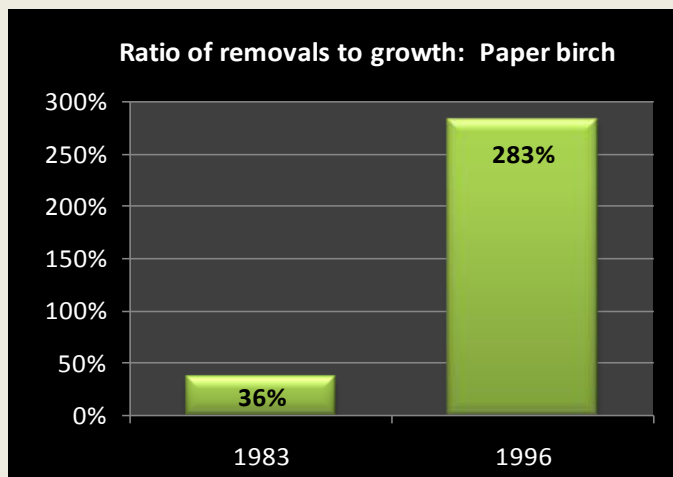


Chart 7. Ratio of volume harvested annually to net growth (2004 to 2008). The ratio for 2008 is not shown as growth was negative.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008

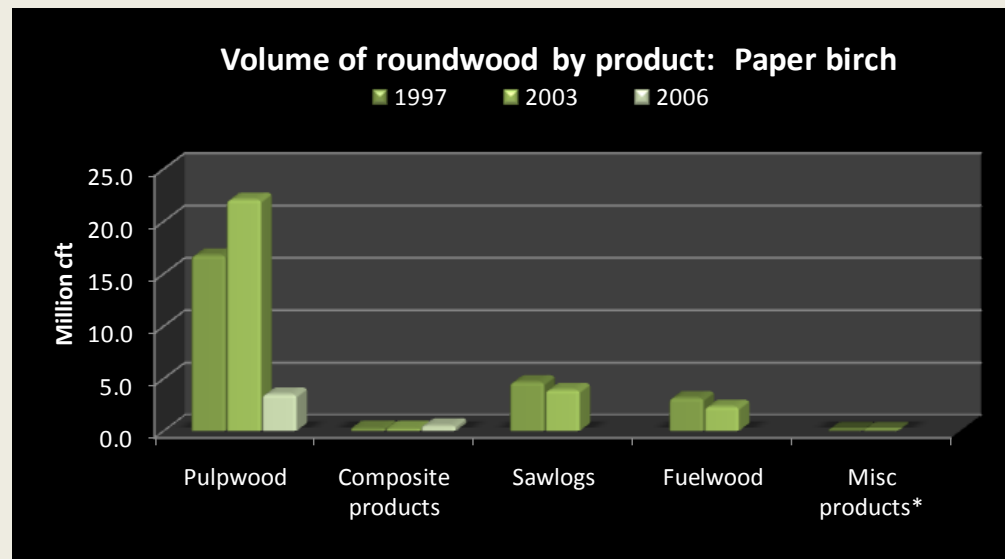


Chart 6. Volume of roundwood products. Numbers for pulpwood and composite products are from 2006. Numbers for sawlogs, fuelwood and miscellaneous products are from 2003 (Ron Piva).

* Miscellaneous products include poles, posts, pilings and veneer.

Source: Timber Products Output Mapmaker, http://ncrs2.fs.fed.us/4801/fiad/rpa_tpo/wc_rpa_tpo.ASP

The ratio of removals to growth tripled between 1983 and 1996 (Chart 7) as growth decreased and removals increased. Since 1996, mortality has exceeded growth, i.e. net growth is negative and is not shown in the chart.

Additional tables:

Average annual growth, mortality and removals by region ([Pdf](#), [Excel](#)).



"How much is paper birch selling for?"

Prices for cordwood & sawtimber: 2000 to present

Due to the variability of timber prices from year to year and region to region, two methods of reporting prices are presented here: [Timber Mart North](#) (Chart 8) and the [weighted average stumpage prices](#) from Wisconsin Administrative Code Chapter NR 46 (Table 4).

Both reporting methods indicate that pulpwood prices have generally decreased from a high in 2004-2006 but are about average for all hardwoods. The average weighted value for logs has been more variable and is lower than the statewide average for hardwoods in 2009.

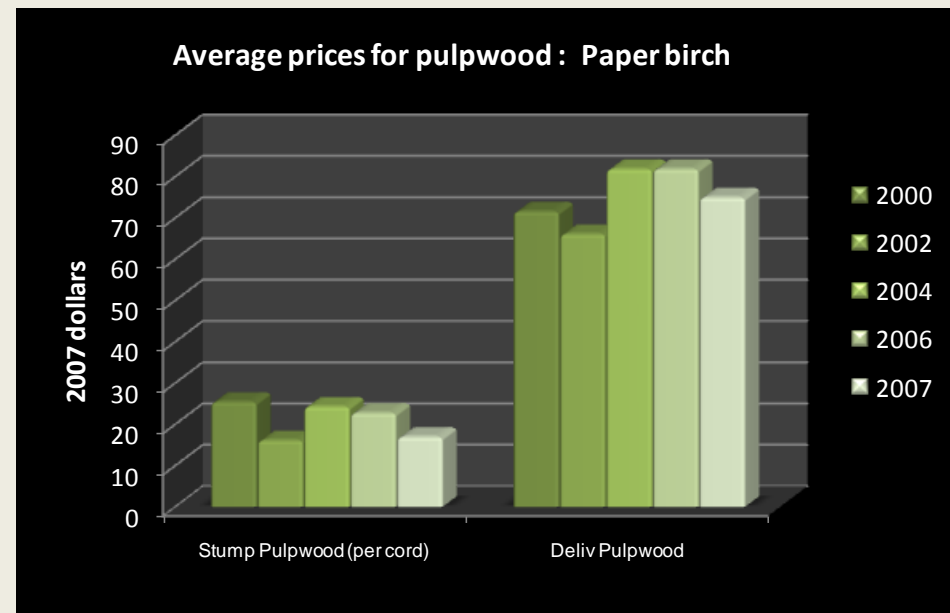


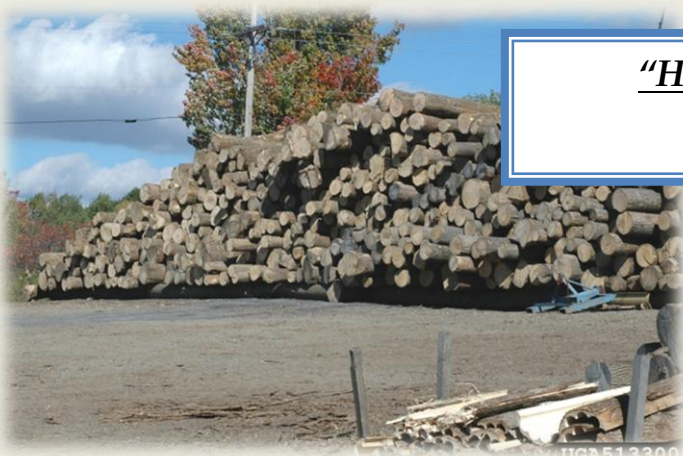
Chart 8. Average prices for cordwood and sawtimber (2007).

Source: Timber Mart North, George Banzhaf & Company, 8301 N. Allen Lane, Milwaukee, WI 53217

Table 4. Average weighted stumpage prices (adjusted for inflation to 2009 dollars) by year for Wisconsin.

| Product | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Average for all hardwoods |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|---------------------------|
| Cordwood (per cord) | \$26 | \$25 | \$26 | \$26 | \$33 | \$48 | \$48 | \$36 | NA | \$22 | \$19 |
| Logs (per MBF) | \$252 | \$273 | \$200 | \$150 | \$224 | \$194 | \$226 | \$247 | \$105 | \$113 | \$140 |

Source: Wisconsin Administrative Code Chapter NR46, 2000 to 2009



"How much paper birch biomass do we have?"

Oven-dry tons by region of the state

There were 19 million oven-dry tons (ODT) of paper birch biomass in 2008, a decrease of about 33 million ODT or 42%, from 1983. This represents 3.2% of all live biomass statewide. As with volume, most paper birch biomass is located in northern Wisconsin (Chart 9).

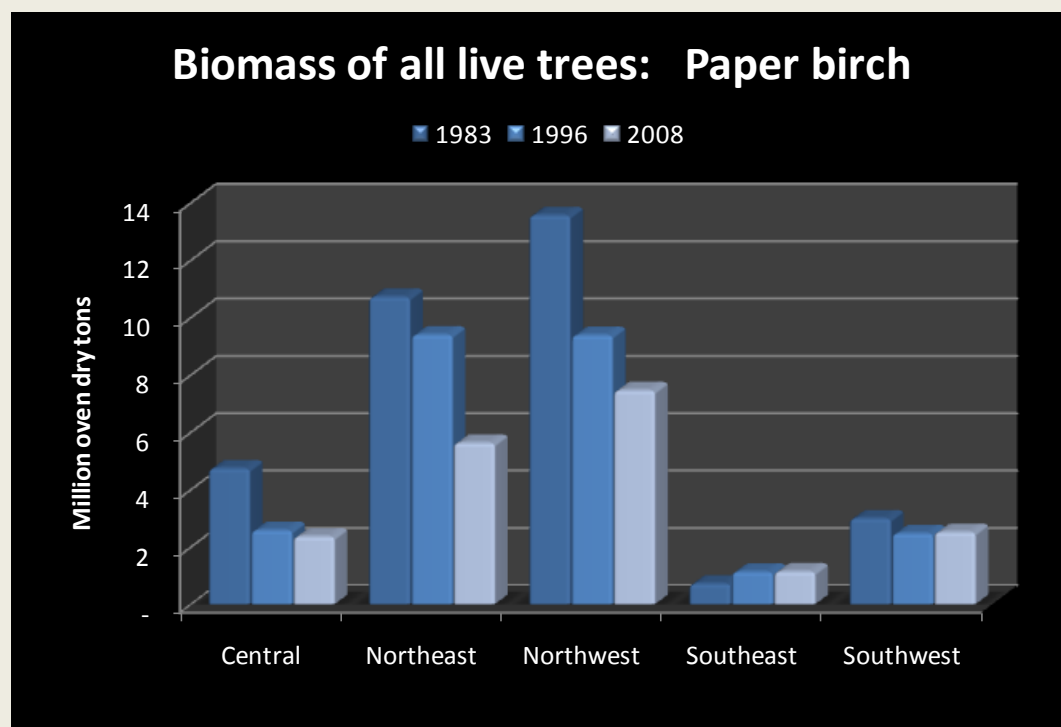


Chart 9. Biomass (million oven-dry tons) by year and region.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, 2008

Paper birch is about average density for hardwoods, with a ratio of biomass to volume of 50.2 oven-dry lbs. per cubic foot (ODP/cft). The average for all trees is about 46.8 ODP/cft and for hardwoods, 50.1 ODP/cft. Approximately, 72% of all biomass is located in the main stem and 19.5% in the branches.

Additional tables: Biomass by county in 2008 ([pdf](#); [Excel](#))